

CARD EDGE CONNECTOR

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to a card edge connector which is mounted on a mother board and freely loads/unloads a daughter board.

Description of the Prior Art

10 Conventionally, a card edge connector, which is mounted on a mother board and freely loads/unloads a daughter board such as a SIMM (single inline memory module), a DIMM (double inline memory module), etc., has been utilized in a
15 personal computer, etc.

For example, a card edge connector shown in FIG. 8 (refer to Japanese Patent Laid Open No. 2000-208183 A) is known as the conventional card edge connector.

20 The card edge connector 101 comprises an insulating housing 110 which is mounted on a mother board A and has a daughter board receiving recess 111 extending in the longitudinal direction, and a plurality of contacts (not shown in the attached
25 drawings) mounted in two upper and lower arrays along the longitudinal direction of the housing 110 and connected to the mother board A. At the both

ends in the longitudinal direction of the housing 110, a pair of metal latch members 120 for holding at a second angle a daughter board B which is first inserted at a first angle (refer to FIG. 8A) into the daughter board receiving recess 111, and then turned into the second angle (refer to FIG. 8B) are provided.

Each latch member 120 is formed by stamping and forming a metal plate, and includes a press fit plate portion 121 to be press fitted into a latch receiving recess 112 formed at the both ends in the longitudinal direction of the housing 110, and a daughter board holding portion 122 bent forward substantially in the shape of the character U from the back end (shown at the top in FIG. 8C) of the press fit plate portion 121. The press fit plate portion 121 is provided with an anti-overstress piece 123 extending forward from its front end, and the anti-overstress piece 123 is provided with a fixing portion 124 bent inward (on the right side shown in FIG. 8C) from the bottom end thereof. The fixing portion 124 is soldered onto the mother board A, thereby fixing the latch member 120 to the mother board A.

The daughter board holding portion 122 comprises a plate portion 122a bent forward substantially in the shape of the character U from

the back end of the press fit plate portion 121, a hook portion 122b in the shape of a hook located forward the plate portion 122a and projecting inward, and a daughter board latching piece 122c bent inward from the top end of the plate portion 122a. The daughter board latching piece 122c returns to the original position after temporarily moving outward by the elasticity of the plate portion 122a when the daughter board B inserted into the daughter board receiving recess 111 is turned from the first angle to the second angle, thereby making contact with the upper surface of the edge of the daughter board B to prevent the lift-free performance of the daughter board B to fix the daughter board B. The hook portion 122b enters the notch (not shown in the attached drawings) formed in the edge of the daughter board B when the daughter board B is located at the second angle, thereby preventing the daughter board B from slipping off the card edge connector 101.

However, there has been the following problems with the conventional card edge connector 101.

That is, since the fixing portion 124 to be soldered to the mother board A is bent from the anti-overstress piece 123 to be integrally formed with the other portions constituting the latch member 120, there can occur defective soldering of

the card edge connector 101 including the latch member 120 because the warp of the mother board A cannot be absorbed if the warp of the mother board A is larger than a predetermined range when the
5 card edge connector 101 is soldered (when the fixing portion 124 is soldered) although the coplanarity (flatness) of the entire connector is in the predetermined range in the assembly of the card edge connector 101.

10 On the other hand, the technology of absorbing the warp of a circuit board when a connector is soldered to the circuit board can be, for example, a device shown in FIG. 9 (Japanese Utility Model Laid Open No. 5-23429 U).

15 A surface mount type connector 201 shown in FIG. 9 is mounted on the surface of a circuit board (not shown in the attached drawings), and comprises an insulating housing 210, and a plurality of contacts 220 attached to the housing 210 and having
20 a solder connection portion 221 to be soldered to the circuit board. Slots 211 penetrating in the vertical direction are formed at the both ends in the longitudinal direction of the housing 210. A metal peg 230 in the shape of the character L
25 movable in a predetermined range in the vertical direction is attached within the slot 211. The bottom surface of the peg 230 is soldered to the

circuit board, thereby reinforcing the fixing to the circuit board of the connector 201.

The peg 230 is inserted downward from above the slot 211 into the slot 211, thereby limiting
5 the upward movement by the cooperation between barbs 231 provided at the both edges of the peg 230 and shoulders 212 formed on the both sides of the slot 211. On the other hand, the downward movement of the peg 230 is limited by the cooperation
10 between the upper edge of a slit 232 formed in the peg 230 and a projection 213 projecting from the housing 210 to the slot 211.

Since the peg 230 is movable in the vertical direction with respect to the housing 210 within a
15 predetermined range, it is also movable in the vertical direction with respect to the solder connection portion 221 of the contact 220 within a predetermined range. Therefore, even if the warp of the circuit board is occurred when the contact
20 220 and the peg 230 are soldered to the circuit board, soldering can be performed successively with the warp of the circuit board absorbed.

However, since the metal peg 230 is directly mounted in the slot 211 formed in the insulating
25 housing 210 in the surface mount type connector 201, the sides of the slot 211 are chipped by the barbs 231 when the peg 230 is mounted, thereby possibly

displacing the peg 230 from the slot 211.

SUMMARY OF THE INVENTION

It is an embodiment of the present invention to provide a card edge connector capable of protecting a fixing member to a mother board from being removed from a latch body and capable of performing a successful soldering with the warp of a mother board absorbed when the entire connector including the fixing member is soldered to the mother board.

According to one aspect of the present invention, there is provided a card edge connector comprises an insulating housing mounted on a mother board, and a latch member attached to the housing for holding at second angle a daughter board which is first inserted at a first angle into the housing and then turned into the second angle, wherein the latch member comprises a metal latch body having a housing attaching portion to be attached to the housing and a daughter board holding portion for holding the daughter board; and a metal fixing member separated from the latch body to be soldered on the mother board; the fixing member is mounted on a tab portion bent from the latch body as movable in the vertical direction in a

predetermined range.

In one embodiment, the card edge connector according to the present invention, when the fixing member is mounted on the tab portion, the movement of the fixing member is limited in a bending direction of the tab portion and in a direction orthogonal to the bending direction of the tab portion with movement in the vertical direction of the fixing member allowed with respect to the tab portion.

In another embodiment, in the card edge connector according to the present invention, the tab portion comprises a broad section bent from the latch body and a narrow section having a width smaller than that of the broad section and extending from a tip of the broad section. Engaging shoulders are formed at tip surfaces of the broad section located at the both sides of the narrow section and an engaging aperture is formed in the narrow section. The fixing member comprises: a plate top portion having an elastic engaging piece and extending in the bending direction of the tab portion; a pair of side plate portions extending downward from the both sides of the plate top portion and having a width sufficient to insert the narrow section between the side plate portions; and a pair of plate bottom portions extending toward each other from the respective lower ends of the pair of the side

side plate portions and having a width between the plate top portions and the plate bottom portions larger than the thickness of the narrow section. The movement in the tab bending direction of the fixing member is limited by one edge in the tab bending direction of the side plate portion of the fixing member touching the engaging shoulder and the elastic engaging piece engaging with the engaging aperture. The movement in the direction orthogonal to the tab bending direction of the fixing member is limited by the pair of side plate portions of the fixing member touching the side edges of the narrow section, and the downward movement of the fixing member is limited by lower surface of the plate top portion of the fixing member touching the upper surface of the narrow section. The upward movement of the fixing member is limited by the upper surface of the plate bottom portion touching the lower surface of the narrow section.

Further, in the card edge connector according of the present invention, a projection is provided around one end portion of the fixing member or the tab portion and the fixing member can be rotated in the vertical direction centering on the projection.

FIG. 1 shows the first embodiment of the card edge connector according to the present invention, wherein FIG. 1A is a plan view, FIG. 1B is a front view, and FIG. 1C is a right side view showing a
5 mother board and a daughter board together;

FIG. 2 shows a latch body constituting a left latch member for use in the card edge connector shown in FIG. 1, wherein FIG. 2A is a part sectional front view, FIG. 2B is a right side view,
10 and FIG. 2C is a left side view;

FIG. 3 is a plan view of the latch body shown in FIG. 2;

FIG. 4 shows a fixing member constituting the left latch member for use in the card edge
15 connector shown in FIG. 1, wherein FIG. 4A is a plan view, FIG. 4B is a front view, FIG. 4C is a left side view, FIG. 4D is a bottom view, and FIG. 4E is a sectional view along the line 4E - 4E shown in FIG. 4A;

20 FIG. 5 is a part sectional front view of the left latch member with the fixing member soldered on the mother board A;

FIG. 6 is a part sectional front view of the right latch member constituting the second
25 embodiment of the card edge connector according to the present invention, wherein FIG. 6A shows a status of the fixing member set parallel to the

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latch member, and FIG. 6B shows a status of the fixing member rotating and inclined to the latch member;

FIG. 7 is a plan view of the latch body
5 constituting the left latch member;

FIG. 8 shows a conventional card edge connector, wherein FIG. 8A is a sectional view of the state of the daughter board inserted at the first angle, FIG. 8B is a sectional view of the
10 state of the daughter board inserted at the second angle, and FIG. 8C is a part plan view of the state of the latch member attached to the housing; and

FIG. 9 shows a conventional surface mount type connector, wherein FIG. 9A is a bottom view, FIG.
15 9B is a sectional view along the line 9B - 9B shown in FIG. 9A, and FIG. 9C is a sectional view along the line 9C - 9C shown in FIG. 9A.

DETAILED DESCRIPTION OF THE PREFERRED

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EMBODIMENT

The embodiments of the present invention are described below by referring to the attached drawings. FIG. 1 shows the first embodiment of the card edge connector according to the present
25 invention, wherein FIG. 1A is a plan view, FIG. 1B is a front view, and FIG. 1C is a right side view. In FIG. 1C, a mother board and a daughter board are

shown together. FIG. 2 shows the latch body constituting the left latch member for use in the card edge connector shown in FIG. 1, wherein FIG. 2A is a part sectional front view, FIG. 2B is a right side view, and FIG. 2C is a left side view. FIG. 3 is a plan view of the latch body shown in FIG. 2. FIG. 4 shows the fixing member constituting the left latch member for use in the card edge connector shown in FIG. 1, wherein FIG. 4A is a plan view, FIG. 4B is a front view, FIG. 4C is a left side view, FIG. 4D is a bottom view, and FIG. 4E is a sectional view along the line 4E - 4E shown in FIG. 4A. FIG. 5 is a part sectional front view of the left latch member with the fixing member soldered on the mother board A.

In FIG. 1, a card edge connector 1 comprises an insulating housing mounted on the mother board A and having a daughter board receiving recess 11 extending in the longitudinal direction (in the horizontal direction in FIG. 1B), and a plurality of contacts 20 arranged in two upper and lower arrays in the longitudinal direction of the housing 10. Each contact 20 comprises a solder connection portion 21 to be soldered onto the surface of the mother board A. At the both ends in the longitudinal direction of housing 10, a pair of latch members 30A and 30B are provided to hold at

the second angle (substantially parallel to the mother board A) the daughter board B which is first inserted at a first angle (inclined to the mother board A) into the daughter board receiving recess 11 and then turned into the second angle. The daughter board B is inserted between the plurality of contacts 20 arranged in the two upper and lower arrays when it is received at the first angle in the daughter board receiving recess 11, and touches the contacts 20 in the two upper and lower arrays when it is turned and held at the second angle. Thus, the daughter board B is electrically connected to the mother board A.

The housing 10 is an insulating member formed substantially in the shape of a rectangle extending in the longitudinal direction, and is made by molding a synthetic resin such as PBT, etc. A rib 12 for preventing the reverse side insertion of the daughter board B is provided at the little right side (right side shown in FIG. 1B) of the center in the longitudinal direction of the housing 10.

The pair of the latch members 30A and 30B are symmetrically set about the center in the longitudinal direction of the housing 10, and comprise the left side latch member 30A arranged on the left side of the center in the longitudinal direction and the right side latch member 30B

arranged on the right side of the center in the longitudinal direction. Since the latch members 30A and 30B are symmetrically arranged, only the configuration of the left side latch member 30A is
5 described below, and the description of the configuration of the latch member 30B is omitted here.

The left side latch member 30A comprises a metal latch body 40 and a metal fixing member 50
10 separated from the latch body 40, as shown in FIG. 1.

The latch body 40 is formed by stamping and forming a metal plate of stainless steel, etc., and comprises a press fit plate portion (housing
15 attaching portion) 41 to be press fitted to the housing 10 as clearly shown in FIGS. 2 and 3. At the front end of the press fit plate portion 41 (at the lower end shown in FIG. 3), a transition portion 43a is extended diagonally forward and
20 outward, and a first plate portion 43 is extended forward from the tip of the transition portion 43a. At the front end on the upper edge of the press fit plate portion 41, a folded end 42 is formed as first extending upward and then folded down inward.
25 On the front edge of the folded end 42, a second plate portion 46 is formed as extending forward substantially parallel to the first plate portion

43. A plurality of projections 48 are formed as projecting outward the folded end 42 to keep a predetermined distance between the first plate portion 43 and the second plate portion 46.

5 At the front end of the second plate portion 46, a daughter board holding portion 47 is provided to hold the daughter board B at the second angle. The daughter board holding portion 47 comprises a daughter board stopper 47a extending from the front
10 end of the second plate portion 46 and bending inward at a predetermined angle, and a daughter board holding piece 47b bending inward from the upper edge of the second plate portion 46. When the daughter board B inserted at the first angle
15 into the daughter board receiving recess 11 is turned at the second angle, the daughter board holding piece 47b is first moved outward by the elasticity of the second plate portion 46, returned to the original position, touches the upper surface
20 of the edge of the daughter board B, and fixes the daughter board B with preventing the lift-free performance of the daughter board B. The daughter board stopper 47a enters the notch (not shown in the attached drawings) formed in the edge of the
25 daughter board B when the daughter board B is located at the second angle and is engaged with the notch, thereby preventing the daughter board B from

slipping off the connector 1 in the forward direction. Provided at the front end of the lower edge and the rear end of the lower edge of the second plate portion 46 are daughter board supporting portion 49a and 49b extending inward to support the daughter board B when the daughter board B is located at the second angle. The daughter board supporting portion 49a and 49b are located in different surface positions such that their upper surfaces can be different in height to take the warp of the daughter board B into account when the daughter board B is located at the second angle.

On the other hand, a tab portion 44 having the plate thickness of t is bent inward from the lower edge of the substantially central portion in the front-to-back direction of the first plate portion 43. The tab portion 44 is extended below the second plate portion 46. The tab portion 44 comprises a broad section 44a bent inward from the first plate portion 43, and a narrow section 44b narrower than the broad section 44a and extending inward from the tip of the broad section 44a. In FIG. 3, the width W_2 of the narrow section 44b is smaller than the width W_1 of the broad section 44a. As shown in FIGS. 3 and 5, engaging shoulders 44c are formed at the tip end of the broad section 44a located on the

both sides of the narrow section 44b. An engaging aperture 44e is formed vertically through the narrow section 44b of the tab portion 44, and a tilting surface 44d, which has a predetermined width and diagonally tilts upward toward the engaging aperture 44e from the tip of the narrow section 44b, is provided at the tip of the narrow section 44b. An anti-over-movement piece 45 comprises a coupling portion 45a bent inward from the front end of the lower edge of the first plate portion 43 and located below the second plate portion 46, and a rising piece 45b rising from the tip of the coupling portion 45a. The second plate portion 46 is located between the first plate portion 43 and the rising piece 45b so that the outward movement of the second plate portion 46 can be limited by the first plate portion 43, and the inward movement of the second plate portion 46 can be limited by the rising piece 45b of the anti-over-movement piece 45.

The fixing member 50 is formed by stamping and forming a metal plate of stainless steel, copper alloy, etc., and comprises a plate top portion 51 extending in the bending direction of the tab portion 44, a pair of side plate portions 52 extending downward from the both sides of the plate top portion 51, and a pair of plate bottom portions

53 extending toward each other from each of the lower ends of the pair of the side plate portions 52 as clearly shown in FIG. 4. The fixing member 50 is solder plated or tinned for connection by
5 soldering.

The plate top portion 51 of the fixing member 50 is provided with a guide board portion 51a provided at the left end of the plate top portion 51 and an elastic engaging piece 54 which is a one-
10 legged beam extending from the left end to the right end of the plate top portion 51 (in the bending direction of the tab unit 44). The elastic engaging piece 54 has a width a little narrower than that of a tilting surface 44d formed on the
15 tab portion 44, and its tip is set free and bent to reach substantially the same level of the top surface of the plate bottom portion 53. The width W_A between the pair of side plate portions 52 is a little larger than the width W_2 of the narrow
20 section 44b such that the narrow section 44b can be inserted between them. The width W_B between the plate bottom portion 53 and the plate top portion 51 is larger than the thickness t of the tab portion 44.

25 The fixing member 50 is mounted on the tab portion 44 of the latch body 40 by pressing the guide board portion 51a of the plate top portion 51

toward the first plate portion 43 of the latch body 40 with the guide board portion 51a traveling along the upper surface of the narrow section 44b of the tab portion 44 as shown in FIG. 5. When the fixing member 50 is mounted, the narrow section 44b of the tab portion 44 is inserted from the tip into the space in the fixing member 50 enclosed by the plate top portion 51, the pair of side plate portions 52, and the pair of the plate bottom portions 53. At this time, the narrow section 44b can be easily inserted by the guide board portion 51a traveling along the upper surface of the narrow section 44b of the tab portion 44. If the narrow section 44b of the tab portion 44 is inserted from its tip into the space in the fixing member 50, then the tip of the elastic engaging piece 54 of the fixing member 50 slides on the tilting surface 44d formed at the tip of the narrow section 44b, the elastic engaging piece 54 deflects upward. If the tip of the elastic engaging piece 54 reaches the engaging aperture 44e, then the elastic engaging piece 54 returns to the original position into the engaging aperture 44e and is engaged with the edge of the engaging aperture 44e. The left edge in the tab bending direction of the pair of side plate portions 52 touches the engaging shoulder 44c formed in the tab portion 44. When the elastic engaging piece 54 is

engaged with the engaging aperture 44e, the tip of the elastic engaging piece 54 is designed to slide on the tilting surface 44d. Thus, the tip of the elastic engaging piece 54 is smoothly led to the engaging aperture 44e. When the elastic engaging piece 54 is engaged with the engaging aperture 44e and the left edge in the tab bending direction of the side plate portion 52 touches the engaging shoulder 44c formed on the tab portion 44, the movement in the bending direction of the tab portion 44 of the fixing member 50 is limited. Simultaneously, the movement in the direction orthogonal to the tab bending direction of the fixing member 50 is limited by the inside of the pair of side plate portions 52 touching the side edge of the narrow section 44b of the tab portion 44. After the fixing member 50 is mounted on the tab portion 44, the fixing member 50 can be moved in the vertical direction (in the z direction shown in FIG. 5) with respect to the tab portion 44. The downward movement of the fixing member 50 is limited by the lower surface of the plate top portion 51 of the fixing member 50 touching the upper surface of the narrow section 44b, and the upward movement of the fixing member 50 is limited by the upper surface of the plate bottom portion 53 touching the lower surface of the narrow section

44b.

The card edge connector 1 is completed when a pair of latch members 30A and 30B are attached to the both sides in the longitudinal direction of the housing 10 to which the plurality of contacts 20 are attached. Then, the card edge connector 1 is surface mounted on the mother board A, and set inside a personal computer, etc.

When the card edge connector 1 is mounted on the mother board A, the solder connection portion 21 of the contact 20 and the plate bottom portions 53 of the fixing members 50 of the latch members 30A and 30B are mounted and then soldered by re-flow soldering method in the predetermined positions on the mother board A as shown in FIGS. 1C and 5. Thus, the card edge connector 1 is mounted on the mother board A.

At this time, since the fixing member 50 can be moved in the vertical direction (in the z direction shown in FIG. 5) with respect to the tab portion 44 of the latch body 40 in a predetermined range, even if the warp of the mother board A is occurred, its warp can be absorbed by the vertical movement of the fixing member 50, and the solder connection portion 21 of the contact 20 and the fixing member 50 can be successfully soldered to the mother board A.

Furthermore, since the tab portion 44 of the latch body 40 and the fixing member 50 are made of metal, there occurs no problem that one of them is chipped when the fixing member 50 is mounted on the tab portion 44, and that the fixing member 50 slips off the tab portion 44 of the latch body 40 due to the chipping.

Additionally, the movement in the tab bending direction of the fixing member 50 is limited by the left edge in the tab bending direction of the pair of side plate portions 52 of the fixing member 50 touching the engaging shoulder 44c formed on the tab portion 44 and the elastic engaging piece 54 being engaged with the engaging aperture 44e. The movement orthogonal to the tab bending direction of the fixing member 50 is limited by the pair of side plate portions 52 of the fixing member 50 touching the side edge of the narrow section 44b formed on the tab portion 44. Since the fixing member 50 can be moved in the vertical direction until the plate top portion 51 and the plate bottom portion 53 touches the narrow section 44b, the fixing member 50 can be correctly mounted on the tab portion 44 with the fixing member 50 set movable in the vertical direction in a predetermined range with respect to the tab portion 44 bend from the latch body 40. Furthermore, by inserting the narrow

section 44b of the tab portion 44 from its tip into the space of the fixing member 50 enclosed by the plate top portion 51, the pair of side plate portions 52, and the pair of plate bottom portions 5 53, the fixing member 50 can be mounted on the tab portion 44. Therefore, the fixing member 50 can be easily mounted on the tab portion 44.

The second embodiment of the card edge connector according to the present invention is 10 described below by referring to FIGS. 6 and 7. FIG. 6 is a part sectional front view of the right latch member constituting the second embodiment of the card edge connector according to the present invention, wherein FIG. 6A shows a status of the 15 fixing member set parallel to the latch member, and FIG. 6B shows a status of the fixing member rotating and inclined to the latch member. FIG. 7 is a plan view of the latch body of the left side latch member.

20 The second embodiment of the card edge connector has the same basic configuration as the card edge connector shown in FIGS. 1 through 5, but is different from it in the shapes of the latch body 40 and the fixing member 50 respectively 25 constituting the latch members 30A and 30B. Since the left side latch member 30A and the right side latch member 30B are symmetric, only the latch body

40 and the fixing member 50 constituting the right side latch member 30B are described below.

The latch body 40 has the substantially the same basic configuration as the latch body 40 shown in FIGS. 1 through 3, and 5, and is formed by stamping and forming a metal plate of stainless steel, etc. As shown in FIG. 7 (FIG. 7 shows the latch body constituting the left side latch member, the latch body has a symmetrical configuration), the latch body 40 comprises the press fit plate portion 41 to the housing, the folded end 42, the first plate portion 43, the second plate portion 46, the daughter board holding portion 47, the anti-over movement piece 45, and the tab portion 44.

The tab portion 44 is different from the tab portion 44 of the latch body 40 shown in FIGS. 1 through 3, and 5. The tab portion 44 shown in FIG. 6 is bent inward from the lower edge of the substantially central portion in the front to back direction in the first plate portion 43, and extends below the second plate portion 46. The tab portion 44 comprises a broad section 44a bent inward from the first plate portion 43 and a narrow section 44b narrower than the broad section 44a and extending inward from the tip of the broad section 44a. Engaging shoulders 44c are formed at the tip

surfaces of the broad section 44a located on the both sides of the narrow section 44b. An engaging aperture 44e is formed vertically through the narrow section 44b of the tab portion 44, and a
5 tilting surface 44d, which has a predetermined width and diagonally tilts upward toward the engaging aperture 44e from the tip of the narrow section 44b, is provided at the tip of the narrow section 44b.

10 Unlike the tab portion 44 of the latch body 40 shown in FIGS. 1 through 3, and 5, two projections 44f projecting upward are provided on the upper surface of the broad section 44a of the tab portion 44. On the other hand, a pair of beads 44g are
15 projected on the upper surface of the narrow section 44b of the tab portion 44 located on the both sides of the engaging aperture 44e. The height of each bead 44g is a little lower than that of the projection 44f.

20 The fixing member 50 has the same basic configuration as the fixing member 50 shown in FIGS. 1, 4, and 5, and is formed by stamping and forming a metal plate of stainless steel, copper alloy, etc. The fixing member 50 comprises a plate top portion
25 51 extending in the bending direction of the tab portion 44, a pair of side plate portions 52 extending downward from the both sides of the plate

top portion 51, and a pair of plate bottom portions 53 extending toward each other from each of the lower ends of the pair of the side plate portions 52 as clearly shown in FIG. 6. The fixing member 50 is solder plated or tinned for connection by soldering.

The plate top portion 51 is provided with a guide board portion 51a provided at the left end of the plate top portion 51 and an elastic engaging piece 54 which is an one-legged beam extending from the left end to the right end of the plate top portion 51 (in the bending direction of the tab unit 44). The elastic engaging piece 54 has a width a little narrower than that of the tilting surface 44d formed on the tab portion 44, and its tip is set free and bent to reach at the level a little higher than the top surface of the plate bottom portion 53. The width between the pair of side plate portions 52 is a little larger than the width of the narrow section 44b such that the narrow section 44b can be inserted between them.

Furthermore, unlike the fixing member 50 shown in FIGS. 1, 4, and 5, the distance from the plate bottom portion 53 to the plate top portion 51 is larger than the sum of the thickness of the tab portion 44 and the height of the projection 44f.

The fixing member 50 is mounted on the tab

portion 44 of the latch body 40 by pressing the guide board portion 51a of the plate top portion 51 toward the first plate portion 43 of the latch body 40 with the guide board portion 51a traveling along the upper surface of the bead 44g and the projection 44f of the tab portion 44 as shown in FIG. 6A. When the fixing member 50 is mounted, the narrow section 44b of the tab portion 44 is inserted from the tip into the space in the fixing member 50 enclosed by the plate top portion 51, the pair of side plate portions 52, and the pair of the plate bottom portions 53. If the narrow section 44b of the tab portion 44 is inserted from its tip into the space in the fixing member 50, then the tip of the elastic engaging piece 54 of the fixing member 50 slides on the tilting surface 44d formed at the tip of the narrow section 44b, the elastic engaging piece 54 deflects upward. If the tip of the elastic engaging piece 54 reaches the engaging aperture 44e, then the elastic engaging piece 54 returns to the original position into the engaging aperture 44e, and is engaged with the edge of the engaging aperture 44e. The left edge in the tab bending direction of the pair of side plate portions 52 touches the engaging shoulder 44c formed in the tab portion 44. When the elastic engaging piece 54 is engaged with the engaging aperture 44e, the tip of

the elastic engaging piece 54 is designed to slide on the tilting surface 44d. Thus, the tip of the elastic engaging piece 54 is smoothly led to the engaging aperture 44e. The movement in the bending direction of the tab portion 44 of the fixing member 50 is limited by the elastic engaging piece 54 being engaged with the engaging aperture 44e and the right edge shown in FIG. 6 in the tab bending direction of the side plate portion 52 touching the engaging shoulder 44c formed on the tab portion 44. Simultaneously, the movement in the direction orthogonal to the bending direction of the tab portion 44 of the fixing member 50 is limited by the inside of the pair of side plate portions 52 touching the side edge of the narrow section 44b of the tab portion 44. After the fixing member 50 is mounted on the tab portion 44, unlike the case shown in FIG. 5, the fixing member 50 can, as shown in FIG. 6B, be rotated in the vertical direction (in the X direction shown in FIG. 6B) centering on the projection 44f. When the lower surface of the plate top portion 51 of the fixing member 50 touches the upper surface of the bead 44g, the downward rotation of the fixing member 50 is limited. When the upper surface of the plate bottom portion 53 touches the lower surface of the narrow section 44b, the upward rotation of the

fixing member 50 is limited.

With the card edge connector according to the second embodiment of the present invention, since the fixing member 50 can be rotated in the vertical direction centering on the projection 44f, even if the warp of the mother board A is occurred, the warp can be absorbed by the rotation of the fixing member 50 in the vertical direction, and the solder connection portion 21 of the contact 20 and the fixing member 50 can be successfully soldered to the mother board A. Furthermore, although the force works on the card edge connector 1 or the latch body 40 to vertically move them upward, no impact is applied to the fixing member 50 because the projection 44f touches the guide board portion 51a substantially constantly. Therefore, a crack is hardly generated in a soldered portion. Additionally, since the projection 44f touches the guide board portion 51a substantially constantly, the mother board A and the daughter board B can be grounded through the latch body 40 and the fixing member 50.

Described above are the embodiments of the present invention, but the present invention is not limited to these embodiments and various amendments can be made to them.

For example, the shapes of the fixing member

50 and the tab portion 44 are not limited to the shapes shown in FIGS. 1 through 5 so far as the fixing member 50 can be mounted on the tab portion 44 with the fixing member 50 movable in the vertical direction in a predetermined range with respect to the tab portion 44 bent from the latch body 40.

The daughter board holding portion 47 of the latch body 40 may be coated with resin.

10 Furthermore, it is not necessary to provide the projection 44f on the tab portion 44 side. That is, it may be provided on the fixing member 50 side so far as the fixing member 50 can be moved in the vertical direction centering on the projection
15 44f.

As described above, in the card edge connector according to the present invention, the latch member comprises a metal latch body having a housing attaching portion attached to the housing
20 and a daughter board holding portion for holding the daughter board, and a metal fixing member separated from the latch body soldered on the mother board. The fixing member is mounted on a tab portion bent from the latch body as movable in the
25 vertical direction in a predetermined range. Therefore, when the entire connector including the fixing member is soldered to the mother board, even

if the warp of the mother board is occurred, the warp can be absorbed by the vertical movement of the fixing member, and the entire connector can be successfully soldered to the mother board.

5 Furthermore, since the tab portion of the latch body and the fixing member are made of metal, there occurs no problem that one of them is chipped when the fixing member is mounted on the tab portion, and that the fixing member slips off the tab
10 portion of the latch body due to the chipping.

Further, the card edge connector according to the present invention, when fixing member is attached to the tab unit, the movement of the fixing member is limited in the bending direction
15 of the tab portion and in the direction orthogonal to the bending direction of the tab portion with the movement in the vertical direction allowed relative to the tab portion. Therefore, the fixing member can be correctly mounted on the tab portion
20 as movable in the vertical direction relating to the tab portion bent from the latch body in a predetermined range.

In the card edge connector according to the present invention, the movement in the tab bending
25 direction of the fixing member is limited by one edge in the tab bending direction of the side plate portion of the fixing member touching the engaging

shoulder and the elastic engaging piece engaging the engaging aperture, and the movement in the direction orthogonal to the tab bending direction of the fixing member is limited by the pair of side plate portions of the fixing member touching the side edges of the narrow section. The downward movement of the fixing member is limited by lower surface of the plate top portion of the fixing member touching the upper surface of the narrow section, and the upward movement of the fixing member is limited by the upper surface of the plate bottom portion touching the lower surface of the narrow section. Therefore, the fixing member can be correctly mounted on the tab portion with the fixing member set movable in the vertical direction in a predetermined range with respect to the tab portion bent from the latch body. Furthermore, by inserting the narrow section of the tab portion from its tip into the space of the fixing member enclosed by the plate top portion, the pair of side plate portions, and the pair of plate bottom portions, the fixing member can be mounted on the tab unit. Therefore, the fixing member can be easily mounted on the tab unit.

Furthermore, in the card edge connector according to the present invention, a projection is provided around one end portion of the fixing

member or the tab portion. Thus, the fixing member can be rotated in the vertical direction centering on the projection. Therefore, even if the warp of the mother board is occurred, the warp can be
5 absorbed by the rotation of the fixing member in the vertical direction, and the solder connection portion of the contact and the fixing member can be successfully soldered to the mother board. Furthermore, since the projection touches the
10 fixing member or the tab portion substantially constantly, no impact is applied to the fixing member although the force works on the card edge connector or the latch body to vertically move them upward, and a crack is hardly generated in a
15 soldered portion. Additionally, the mother board and the daughter board can be grounded through the latch body and the fixing member.

WHAT IS CLAIMED IS:

1. A card edge connector comprising an insulating housing mounted on a mother board, and a latch member attached to the housing for holding at
5 second angle a daughter board which is first inserted at a first angle into the housing and then turned into the second angle, wherein

said latch member comprises:

10 a metal latch body having a housing attaching portion to be attached to the housing and a daughter board holding portion for holding the daughter board; and

a metal fixing member separated from the latch
15 body to be soldered on the mother board ;

said fixing member is mounted on a tab portion bent from the latch body as movable in the vertical direction in a predetermined range.

20 2. The card edge connector according to claim 1, wherein when said fixing member is mounted on the tab portion, the movement of the fixing member is limited in a bending direction of the tab portion and in a direction orthogonal to the bending
25 direction of the tab portion with movement in the vertical direction allowed with respect to the tab portion.

3. The card edge connector according to claim 1 or 2,
wherein said tab portion comprises a broad section
bent from the latch body and a narrow section
5 having a width smaller than the broad section and
extending from a tip of the broad section, and
engaging shoulders are formed at tip surfaces of
the broad section located at the both sides of the
narrow section, and an engaging aperture is formed
10 in the narrow section;

said fixing member comprises: a plate top
portion having an elastic engaging piece and
extending in the bending direction of the tab
portion; a pair of side plate portions extending
15 downward from the both sides of the plate top
portion and having a width sufficient to insert
the narrow section between side plate portions ;
and a pair of plate bottom portions extending
toward each other from the respective lower ends of
20 the pair of the side plate portions and having a
width between the plate top portions and the plate
bottom portions larger than a thickness of the
narrow section;

movement in the tab bending direction of the
25 fixing member is limited by one edge in the tab
bending direction of the side plate portion of the
fixing member touching the engaging shoulder and

the elastic engaging piece engaging the engaging aperture;

movement in the direction orthogonal to the tab bending direction of the fixing member is
5 limited by the pair of side plate portions of the fixing member touching the side edges of the narrow section; and

downward movement of the fixing member is limited by lower surface of the plate top portion
10 of the fixing member touching the upper surface of the narrow section, and upward movement of the fixing member is limited by the upper surface of the plate bottom portion touching the lower surface of the narrow section.

15

4. The card edge connector according to any one of claims 1 to 3, wherein a projection is provided around one end portion of the fixing member or the tab section, and the fixing member can be rotated in the
20 vertical direction centering on the projection.

CARD EDGE CONNECTOR

ABSTRACT OF THE DISCLOSURE

In a card edge connector 1, latch members 30A and 30B each comprise a metal latch body 40 having a housing attaching portion 41 to be attached to the housing 10 and a daughter board holding portion 47 for holding a daughter board B, and a metal fixing member 50 separated from the latch body 40 to be soldered on a mother board A. The fixing member 50 is mounted on a tab portion 44 bent from the latch body 40 as movable in the vertical direction in a predetermined range.

Figure 5